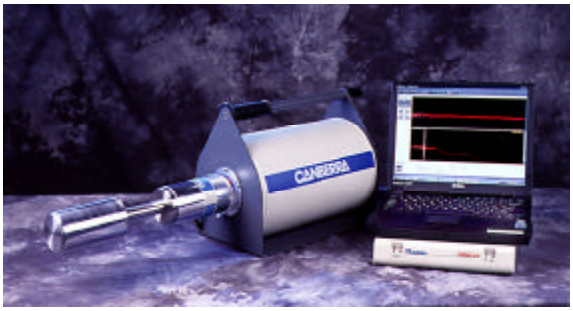


The In-Situ Underwater Gamma Spectroscopy System and submersible unit housing

INEEL
Idaho National Engineering & Environmental Laboratory
BECHTEL BWXT IDAHO, LLC

Technical Demonstration Summary Sheet

IN-SITU UNDERWATER GAMMA SPECTROSCOPY SYSTEM

THE NEED

The Idaho National Engineering and Environmental Laboratory (INEEL) has a need to perform non-destructive in-situ underwater radiological characterization. Current methods include removing the item or extracting a piece of the item from the pool, shielding it, packaging it for transportation to a laboratory for isotopic identification, then reversing the process. This is a labor intensive and time consuming process that creates secondary waste and exposes the worker to radioactive and hazardous materials.

THE TECHNOLOGY

The In-Situ Underwater Gamma Spectroscopy System (ISUGS) uses existing instrumentation and computer software developed by Canberra and adapts it for use as a submersible unit, including modifying the efficiency calculations. The system is available as commercial service from FRAMATOME Technologies. ISUGS components include: the In-Situ Object Counting System (a 3 keV – 2 MeV germanium detector), high-voltage power supply, single-port multi-attitude liquid nitrogen cryostat and remote detector chamber, submersible housing with electronics and vent umbilical, ten externally mounted interchangeable shielded collimators, multi-channel analyzer, laptop computer, desktop computer, and associated software. A wall mounted detector support bracket with adjustable X-Y slides, dual elevation wire rope rigging attachments, and detector housing strongback with distance measurement device was developed for this demonstration. The submersible unit along with the detector and the collimators weighs approximately 500 pounds. This technology can operate in a relatively high radiation field (dose rates ranging from 0.050 to >1,000 R/hour).

THE DEMONSTRATION

The technology was demonstrated in May, 2000, at the INEEL Test Reactor Area (TRA) Facility to characterize radioactive material in TRA Material Test Reactor (MTR) Building 603 canal. For safety reasons, the system was attached to the canal wall using a project specific support bracket. The ISUGS was lowered into the canal and a scan performed to obtain background radiation levels. A collimator was then selected based on the radiation background. Using remote handling tools, objects to be characterized were moved to the unit for scanning. Scan times varied between 90 to 300 seconds

THE RESULTS

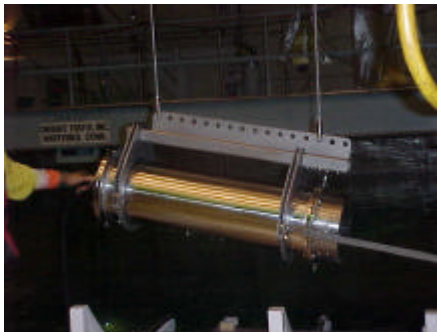
Use of the In Situ Underwater Gamma Spectroscopy System reduces worker exposure by removing them from the immediate vicinity of the radioactive source. The ISUGS eliminated the need for sample collection thereby reducing the hazardous waste generated as a by-product of collecting samples. An estimated $9,000 can be saved on a single item characterization with an additional $11,000 savings on each additional item characterized during the same event.

CONTACTS

- Chelsea Hubbard, Project Manager, U.S. Department of Energy, Idaho Operations Office, (208) 526-0645.
- Steve Bossart, U.S. Department of Energy, National Energy and Technology Laboratory, DDFA (304) 285-4643.
- Dick Meservey, Project Manager, Idaho National Engineering and Environmental Laboratory (INEEL) (208) 526-1834.
- Vince Daniel, INEEL, Test Engineer, (208) 526-5738.
- Matthew Hernandez, FRAMATOME Technologies, Lynchburg, VA (804) 832-2408.

BENEFITS

- Reduces worker exposure
- Accelerates schedule
- Less than 5 minutes compared to 65 days to get data
- 1/2 to 1/5 the cost of the Baseline
- Reduces spread of contamination
- Minimizes secondary waste



Preparing the ISUGS system for immersion

NETL